Science Objectives	Measurement Requirements	Mission Requirements	Instrument Functional Requirements	Nominal Instrument Characteristics	Data Products
Determine with high accuracy both the **radiative *forcing* of the atmosphere** resulting from greenhouse gas emissions & aerosols and the ***response* of the atmospheric variables** to the forcing.	**Measure absolute spectrally resolved radiance in the IR over full thermal band (200-2000 cm^{-1}, 1 cm^{-1} resolution) with accuracy 0.1K (at 3 σ). Provide high-latitude coverage**, in particular for measument of the second harmonics of diurnal cycle.	**Three satellites in 90º orbits at 750 km altitude. The planes of orbits are separated by 60º**. *Equator crossings are phase-shifted by 5º*. **All three carry redundant interferometers and are gravity gradient stabilized.** Nominal mission duration 2 years. *Orbit period 99.95*	**Interferometer in the spectral range 200 - 2000 cm-1 with resolution of $1cm^{-1}$ to achieve accuracy is 0.1K, 3σ.** Nominally sample the Earth every 15 seconds at **nadir view with IFOV=FOV=100km**, with 4 second integration and motion compensation to 0.001 IFOV. Acquire a black body or a deep space view for every measurement (fall back - do one of these for every 10 measurements). **Dual blackbody**	**The interferometer low-end estimates: mass 13 kg, power 8 W, size 0.5 m3.**	**Time series of radiance in the thermal band** with full latitudinal coverage and diurnal cycle resolved. Latitudinal coverage is contiguous
Characterize **forcing of the climate system caused by changes in snow cover, sea ice, land-use, aerosols, and cloud properties** by measuring **solar irradiance reflected from the Earth-atmosphere system back to space.**	**Systematic spatial resolved time series of spectrally resolved flux traceable to NIST returned from the Earth to space in near UV, visible, and near IR (300-2000 nm).**	**One satellite carries redundant UV-VIS-IR spectrometers for measuring radiance and irradiance from near UV to near IR.**	**Simultaneous forward-backward viewing angles about nadir.** (Assume two views aligned along track). Long-term high-accuracy (TBS, **goal 0.3%**) time series of reflected solar radiance. Footprint 100 km is assumed.	UV/VIS/NIR rough estimates: mass 52-100 kg, power 61-150 W, size 0.5x0.6x0.5 m3. Assume cal lamp, diffuse cal target, **ability to view moon**. **Forward/back look** achieved with two independent instruments.	**Time series of UV/VIS/NIR radiance** with full latitudinal coverage
Obtain the **refractive properties of the atmosphere** to reconstruct the height (z) profiles of **pressure, temperature, and water vapor**.	**Observe the time delay of GNSS signals in limb soundings** to obtain the **0.1 K accuracy** in temperature.	**All three satellites carry an occultation GPS receiver** with atomic clock.	Available GPS technology.	GPS will be available on different platforms - likely to be ~9 kg.	Height profiles of **pressure, temperature, and water vapor.**
Establish a **high-accuracy calibration** radiance **standard for use by broadband instruments on other satellites.**	**Traceable accuracy on-orbit. Establish independent analysis of time-dependent bias in calibrated radiance. Form a basis for inter-comparison of all operating sounders.**	Accurate pointing control to achieve **98% FOV matching: 2 km of 100 km.**	**FOV must be large enough (100 km) to allow very accurate comparison with other radiometers. It must be narrow enough to allow close match of viewing zenith and azimuth angles within ± 5º.**		Accurate radiance data for **calibration of instruments on other satellites.**